

REMARKS

Claim 20 has been canceled. Claims 1-19 and new Claim 21 are active in the case.

Reconsideration is respectfully requested.

The present invention relates to an aqueous polyurethane dispersion.

Specification

The objection to the specification on the basis of misinformation in Examples 1 and 4 is not understood. Applicants' copy of the specification as filed correctly indicates "6 g of a monomer mixture" for each example. Moreover, the image of the file wrapper in private pair on page 14 recites "6 g of a monomer mixture" for each of Examples 1 and 4. (A copy of this page of text is attached to the present response.) It does not appear that correction of the text is necessary.

Claim Objection

Claim 20 has been canceled, thereby obviating the issue that has been raised.

Claim Amendments

New Claim 21 finds support in the text at page 3, lines 17-18. Entry of the new claim is respectfully requested.

Claim Rejection, 35 USC 102 & 35 USC 103

Claims 1, 2, 4, 5 and 9 stand rejected based on 35 USC 102 and 35 USC 103 as anticipated by or rendered obvious over Reusmann et al, U.S. Patent Publication 2003/0198819. This ground of rejection is respectfully traversed.

Reusmann et al discloses a several step process of forming aqueous polysiloxane-polyurethane dispersions as set forth in paragraph [0026] of the document. The first step is the preparation of an isocyanate-functional prepolymer (I) from components a), b), c), d), f) and g) of page 1, column 2 of the document. This prepolymer is then reacted with an isocyanate-functional prepolymer (II) in the presence of either component b) and/or d) of page 1, column 2, the NCO/OH ratio being about 1.2:1 to about 1.6:1 in an organic solvent such as described in [0061]. Then, in another step, the product is reacted with additional polyol as component b) and or d) in order to prepare the final hydroxyl-containing polysiloxane-polyurethane polymer. This product is then dispersed by addition of water in the presence of a neutralizing agent. However, importantly, this technique does not form a dispersion of particles having sizes of those of miniemulsions. Rather, the technique of Reusmann et al results in so-called secondary dispersions which are formed by first polymerizing the reacting components in an organic solvent and then afterwards dispersing the pre-made polymer in water.

By contrast, the dispersions of the present invention are so-called primary dispersions which are formed by polymerizing a miniemulsion of monomers directly in water, thereby forming the aqueous dispersions in a single step. These polymer dispersions retain the particle sizes of the miniemulsion. Accordingly, the dispersions made by these two different routes differ from each other in terms of the particle sizes of the dispersed phase, as well as molecular weight and molecular weight distribution of the polymers which are formed. The miniemulsions have a particle size in the range of 50 to 500 nm. Reusmann et al does not show or suggest particle sizes of the dispersions produced within this range. Therefore, the emulsion of the reference is not that of the present invention.

Applicants again point to the fact that the polymerization process of Reusmann et al occurs in an organic solvent solution. This is not a polymerization under emulsion conditions,

let alone miniemulsion conditions. Further, one of skill in the art would not be led in any way to select a different process in which emulsions are formed to prepare the polysiloxane-polyurethane product in view of the comments in paragraph [0025] where it is indicated that when introducing relatively high molecular weight masses of polydimethylsiloxanediols into the reaction media in order to prepare polysiloxane-polyurethane products, it is not possible to do so by art known methods, because of “severe incompatibility” of the polydimethylsiloxanediol with the organic reaction components.

Claims 1-5, 9, 10 and 17-19 stand rejected based on 35 USC 103 as obvious over Reusmann et al, U.S. Patent Publication 2003/0198819 in view of Licht et al, U.S. Patent Publication 2004/0077777. This ground of rejection is respectfully traversed.

As seen from the discussion above, Reusmann et al teaches the preparation of secondary dispersions of polysiloxane-polyurethane. On the other hand, Licht et al teaches primary aqueous polyurethane dispersions that are prepared in the state of miniemulsions. Thus, the two references teach two fundamentally different types of aqueous polyurethane dispersions, which is very significant in view of the comments made in paragraph [0025] of Reusmann et al as discussed above. That is, Reusmann et al teaches that the incorporation of high molecular weight siloxanediols into polyurethanes is not possible by state of the art procedures, because of the incompatibility between siloxane and the organic reaction components, so that one of skill in the art would not look beyond the process disclosed in Reusmann et al for preparing polysiloxane-polyurethane dispersions. The expectation coming forth from the teachings of the combined references is that there would be no reasonable expectation of success to incorporate the inorganic polysiloxanes into organic polyurethanes when using any other prior art techniques such as that disclosed by Licht et al.

It is also pointed out that without the use of hindsight, which is not permitted, it could not have been predicted from the prior art that the present process as claimed would be

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successful at all for a polysiloxane/polyurethane system. Because of the incompatibilities of silicones with organic compounds, as well as the incompatibilities of both with water, the result of a reaction of a polysiloxane with the organic compounds in water would not be predictable. One possibility prediction would be that a first phase of dispersed silicone particles and a second phase of dispersed organic compounds would be formed in water when attempting to prepare the miniemulsions which might result in no reaction at all between the separated siloxane and organic compounds. Accordingly, it is clear that the combined references do not obviate the invention as claimed and withdrawal of the rejection is respectfully requested.

A significant aspect of the present invention is shown by the data in the examples of the text. That is, Example 10 of the present invention describes polymer particles that have a particle size of 104 nm. The dispersion of comparative Example 11 contains an organic diol (PolyTHF 1000) instead of polysiloxanediol (Tegomer H-Si2111). The particle size of the polymer has a significantly higher size of 217 nm. This is quite unexpected, but desirable, because lower particle sizes generally give rise to better film-formation and spreading on surfaces, as well as less sedimentation and higher stability of the dispersions. This beneficial reduction in particle size would not have been expected from the cited prior art combination of references.

Claims 6-8 stand rejected based on 35 USC 103 as obvious over Licht et al, U.S. Patent Publication 2004/0077777 in view of Reusmann et al, U.S. Patent Publication 2003/0198819. This ground of rejection is respectfully traversed.

The rejection of Claims 6-8 is traversed for the same reasons as stated above with respect to the combination of Reusmann et al and Licht et al. Withdrawal of the rejection is respectfully requested.

Claims 11 and 12 stand rejected based on 35 USC 103 as obvious over Reusmann et al, U.S. Patent Publication 2003/0198819 in view of Licht et al, U.S. Patent Publication 2004/0077777 further in view of Krankenberg et al, U.S. Patent 6,617,391. This ground of rejection is respectfully traversed.

The rejection of Claims 11 and 12 is traversed for the same reasons as stated above with respect to the combination of Reusmann et al and Licht et al. Krankenberg et al does not improve upon the deficiencies of Reusmann et al and Licht et al, because it simply discloses a polysiloxane compound that is terminated with aliphatic or aromatic hydrocarbon radicals that do not have active hydrogen atom substitution. The polysiloxane compounds *per se* are simply useful as a component of haircare formulations, and do not react as required in the other cited prior art or the present invention. Withdrawal of the rejection is respectfully requested.

Claims 13-16 stand rejected based on 35 USC 103 as obvious over Reusmann et al, U.S. Patent Publication 2003/0198819 in view of Licht et al, U.S. Patent Publication 2004/0077777 further in view of Kim et al, U.S. Patent 6,932,964. This ground of rejection is respectfully traversed.

The rejection of Claims 13-16 is traversed for the same reasons as stated above with respect to the combination of Reusmann et al and Licht et al. Kim et al does not improve upon the deficiencies of either primary reference. Kim et al does not teach or suggest the preparation of a primary emulsion of particles of a polysiloxane-polyurethane product which is in the form of a miniemulsion. Accordingly, the cited combination of references does not obviate the invention as claimed and withdrawal of the rejection is respectfully requested.

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It is now believed that the application is in proper condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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